Senior Service College FELLOWSHIP PROJECT

A STRATEGIC LOOK AT THE FEDERAL MEDICAL RESPONSE TO DISASTERS

BY

LIEUTENANT COLONEL VIVIAN T. HUTSON
United States Army

USAWC CLASS OF 2007

U.S. Army War College, Carlisle Barracks, PA 17013-5050

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE *(DD-MM-YYYY)*	**2. REPORT TYPE**	**3. DATES COVERED** *(From - To)*
30-03-2007	Civilian Research Paper	

4. TITLE AND SUBTITLE

A Strategic Look at the Federal Medical Response to Disasters

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)

LTC Vivian T. Hutson, USA

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

U.S. Army War College
122 Forbes Avenue
Carlisle, PA 17013

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)

Department of Health and Human Services
Office of the Assistant Secretary for
Preparedness and Response
200 Independence Ave SW, Suite 638G
Washington, DC 20201

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION / AVAILABILITY STATEMENT

DISTRIBUTION A: UNLIMITED

13. SUPPLEMENTARY NOTES

The views of the academic research paper are those of the author and do not reflect the official policy of the U.S. Government, the Department of Defense, or any of its agencies.

14. ABSTRACT

The federal government has taken on an increased role in preparing for and responding to natural or man-made disasters in the United States, both by strengthening state and local capabilities and through the deployment of its own resources. A key federal program for responding to the health and medical consequences of disaster is the National Disaster Medical System (NDMS), which has a mission of medical response to supplement state and local healthcare resources, evacuation of patients from the disaster area, and the provision of definitive care hospital beds to care for victims. In 2005, the federal government mounted a huge disaster relief response for Hurricanes Katrina and Rita. This paper examines the part that NDMS and other federal programs had in the medical relief for those storms, and the subsequent changes that were prompted by perceived inadequacies in the federal disaster response effort, including transferred leadership of NDMS to the Department of Health and Human Services (HHS) and the reaffirmation of the HHS Secretary's role to lead all federal public health and medical response to emergencies. Recommendations are made to make HHS more capable of leading this response, and to improve the effectiveness of NDMS.

.

15. SUBJECT TERMS

National Disaster Medical System; Medical Emergency Preparedness; Department of Health and Human Services; Hurricane Katrina

16. SECURITY CLASSIFICATION OF:			**17. LIMITATION OF ABSTRACT**	**18. NUMBER OF PAGES**	**19a. NAME OF RESPONSIBLE PERSON**
a. REPORT	**b. ABSTRACT**	**c. THIS PAGE**			**19b. TELEPHONE NUMBER** *(include area code)*
UNCLASSIFED	UNCLASSIFED	UNCLASSIFED	UNLIMITED	48	

CIVILIAN RESEARCH PROJECT

A STRATEGIC LOOK AT THE FEDERAL MEDICAL RESPONSE TO DISASTERS

by

Lieutenant Colonel Vivian T. Hutson
United States Army

Captain Ann R. Knebel
Program Adviser
United States Public Health Service
Department of Health and Human Services (HHS)

Disclaimer

The views expressed in the academic research paper are those of the author and do not necessarily reflect the official policy or position of the US Government, the Department of Defense, or any of its agencies

U.S. Army War College
CARLISLE BARRACKS, PENNSYLVANIA 17013

ABSTRACT

AUTHOR: Lieutenant Colonel Vivian T. Hutson

TITLE: A Strategic Look at the Federal Medical Response to Disasters

FORMAT: Civilian Research Project (CRP)

DATE: March 28, 2007 WORD COUNT: 12,237 PAGES: 48

KEY TERMS: National Disaster Medical System; Medical Emergency Preparedness; Department of Health and Human Services; Hurricane Katrina

CLASSIFICATION: Unclassified

The federal government has taken on an increased role in preparing for and responding to natural or man-made disasters in the United States, both by strengthening state and local capabilities and through the deployment of its own resources. A key federal program for responding to the health and medical consequences of disaster is the National Disaster Medical System (NDMS), which has a mission of medical response to supplement state and local healthcare resources, evacuation of patients from the disaster area, and the provision of definitive care hospital beds to care for victims. In 2005, the federal government mounted a huge disaster relief response for Hurricanes Katrina and Rita. This paper examines the part that NDMS and other federal programs had in the medical relief for those storms, and the subsequent changes that were prompted by perceived inadequacies in the federal disaster response effort, including transferred leadership of NDMS to the Department of Health and Human Services (HHS) and the reaffirmation of the HHS Secretary's role to lead all federal public health and medical response to emergencies. Recommendations are made to make HHS more capable of leading this response, and to improve the effectiveness of NDMS.

A STRATEGIC LOOK AT THE FEDERAL MEDICAL RESPONSE TO DISASTERS

The federal government of the United States, as part of its Constitutional mandate to ”provide for the common defense and general welfare,” has developed means to assist its domestic population when they are hurt by a disaster or by an attack upon the country in the form of terrorism. Assistance can take many forms, one of which is medical aid to individuals harmed by a disaster, either directly or because they have lost the means to care for pre-existing conditions. Twenty-three years ago, several federal agencies formed a partnership to initiate the National Disaster Medical System (NDMS), a program designed in part to provide this kind of domestic medical response. This paper will examine whether NDMS is, today, still a relevant and needed program, how it fits into the overall federal health and medical disaster response system, and whether changes ought to be made in its structure or operations.

The United States is a large country that annually suffers dozens or hundreds of events that can be called “disasters,” the vast majority of which are natural and usually weather-related. Fires, floods, earthquakes, blizzards, tornadoes, hurricanes, and other phenomena disrupt lives and cause huge amounts of infrastructure and economic damage, as well as injury and death. Most of the work to prevent, mitigate, or relieve the effects of disaster is taken not by the federal government, but rather by the private sector and by state and local governments.

State governments have the primary responsibility for ensuring the safety and welfare of their residents, and every state has programs for emergency preparedness and civil defense. The majority of their resources are on the community level. The first responders to a given disaster are likely to be local police, fire fighters, and paramedics.

Other community assets, such as road departments, animal control officers, public transportation authorities, and, of course, hospitals are likely to be needed as well. Beyond the efforts of government, the private sector plays a major, and often overlooked, role in disaster response. Individual businesses work to safeguard their own employees and property; utility companies scramble to restore power and gas service; television and radio stations broadcast emergency information; insurance companies send teams to mitigate, assess, and reimburse losses; and a multitude of small businesses will be involved in the necessary digging out, cleaning up, demolition, and rebuilding. Private sector assets involved in medical and public health response include doctor's offices, veterinary clinics, ambulance (and air ambulance) services, laboratories, and for-profit hospitals and health maintenance organizations (HMOs). Also included in the private sector are non-governmental organizations (NGOs) involved in relief or charitable work, ranging from national presences such as the American Red Cross and the Salvation Army, to local church and school groups.

The federal government does not become involved in the response to many disasters that are relatively small or localized and, if it does, the federal role may be quite small. When it does step in, the most common disaster federal relief action is simply to reimburse other disaster responders and to pay for infrastructure repair. The primary form of assistance to the states is the President's Disaster Relief Program, authorized by the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Public Law 93-288), known as the Stafford Act. The governor of a state or territory may request that the President make an "Emergency Declaration," providing up to $5 million in federal assistance, or a "Major Disaster Declaration," which makes available a

wide range of federal assistance programs for individuals, groups, and governments, and funding for both emergency and permanent infrastructure work. A typical year may see forty-five or fifty such declarations—since 1980 there have been only three years in which more than sixty disasters have been approved for federal assistance (37). Besides the incidents more commonly thought of as "disastrous," the federal government has paid compensation for such events as crop loss from drought, lower salmon catches caused by the effects of *El Nino*, and snow removal in Washington DC.

In most years, however, there will be a small number of natural disasters that are of such magnitude that the federal government takes a direct, operational role in the response. Even then, a major part of the federal response may be to help in the coordination of state, local, and private resources. Primary responsibility for the relief effort remains with the states, even for the really big disasters that come along once or twice in a decade and which result in a massive commitment of federal resources.

This same model is used for responding to acts of domestic terrorism. As with natural disasters, state, local, and private entities are expected to make the most immediate response, but that law enforcement responsibilities are assumed by the Federal Bureau of Investigation and other agencies of the U.S. Department of Justice. Incidents of terrorism are much less common than natural disasters, and usually do not inflict the same scale of damage, but much effort is expended to anticipate truly large attacks and for plans to mitigate their damage. As it is, the response to a terrorist attack will have commonalities with that for a natural disaster (or for an accidentally-caused manmade disaster)—assets will be deployed under the processes and controls outlined in the National Response Plan. Thus, the preparations made for responding to

disasters in general, and to particular types of disaster, will overlap with those that must be made for response to terrorist attack, particularly for responding to public health and medical needs.

The National Disaster Medical System

It was, of course, the terrorist attacks of September 11, 2001, and the anthrax mailings that occurred just afterwards that magnified the concern of how to respond to a large-scale terrorist incident. The attacks prompted passage of the Public Health Security and Bioterrorism Preparedness and Response Act of 2002 (Public Law 107-188), which statutorily authorized NDMS under the new position of Assistant Secretary for Public Health Emergency Preparedness at the Department of Health and Human Services (HHS). In March 2003, NDMS was transferred to the newly created Department of Homeland Security (DHS) by the Homeland Security Act of 2002 (Public Law 107-296).

NDMS was originally created in 1984 as a partnership between HHS, the Department of Defense (DoD), and the Federal Emergency Management Agency (FEMA). The Department of Veterans' Affairs (VA) was added as a partner two years later. The partnership Memorandum of Agreement (MOA), revised periodically, provides a framework for providing medical and ancillary services when a disaster overwhelms local emergency capabilities. The three-part mission of NDMS has remained: medical response to supplement state and local healthcare resources, evacuation of patients from the disaster area, and the provision of definitive care by providing a hospital surge capacity to care for disaster victims or for military casualties from an overseas war.

FEMA is an important partner in NDMS as it is the primary federal coordinating agency for administering and funding disaster response and relief operations. The agency was established in 1979 in response to concerns that the federal government's disaster and emergency preparedness programs were too fragmented and had not performed well when responding to the Three Mile Island incident or the devastation caused by Tropical Storm Agnes (37). FEMA became part of DHS in March 2003, along with NDMS, but continues to perform the same functions as before and has retained its identity as a distinct agency. It administers the Disaster Relief Fund, established by the Stafford Act, providing funds not only to state, local, and private entities but also reimbursing federal agencies for work performed under the Act. It receives requests for assistance from the states and assigns other government agencies to respond. It works with the states and others to prepare tactics and operations for response to specific emergencies. For most disasters where there is a federal operational role, a senior FEMA official is designated as the on-scene coordinator, though DHS may designate a law enforcement official to act as the coordinator at the scene of terrorist events.

The other NDMS partners, the DoD and VA, besides their historic interest in accommodating war casualties, have established roles in disaster response. The VA is the second largest cabinet department and operates the nation's largest integrated healthcare system. Besides its three well-known missions of medical care, education, and research, the VA has a lesser-known mission of contingency support in emergencies. This function has grown over time from that of providing back-up support to the DoD in wartime to a comprehensive all-hazards emergency management

program under the guidance of its Emergency Management Strategic Healthcare Group (55). The VA participates in emergency medical response measures with other federal, state, and local agencies, and is listed as a supporting agency in seven of the National Response Plan's emergency support functions, discussed below. Forty-three VA medical centers serve as NDMS Federal Coordinating Centers, and the department procures and maintains some of the strategically placed stockpiles of drugs and medical supplies (pharmacy caches) overseen by HHS's Centers for Disease Control and Prevention (20). Additionally, the VA has a mission to support reaction to "radiological emergencies" and maintains the Medical Emergency Radiologic Response Team, a twenty-five member unit of VA employees that can be mobilized to a disaster site within about 24 hours (27).

Even before the creation of the DoD in 1949, the U.S. military has had a long-standing tradition of providing disaster relief. For example, an Army general took charge of coordinating the emergency response to the 1906 San Francisco earthquake and some 4,000 soldiers took part in activities there such as fire fighting and the feeding and sheltering of victims (59). With its organizational abilities, large number of personnel, medical and transportation assets, and other resources, the DoD provides unmatched capability for emergency response. Historically, however, the active military has been considered to be a resource of last resort, to be employed only when local, state, and other federal capabilities are inadequate (5).

Currently, Homeland Security Presidential Directive-5 states: "The Secretary of Defense shall provide military support to civil authorities for domestic incidents as directed by the President or when consistent with military readiness and appropriate

under the circumstances and law." The Assistant Secretary of Defense, Homeland Defense, (ASD/HD) has been delegated authority to approve requests for assistance from civilian agencies. U.S. Northern Command (NORTHCOM) has the operational responsibility for civil support in most of the United States. It carries out civil support missions with forces from all of the armed services, typically through the creation of a joint task force. NORTHCOM has a permanent Joint Interagency Coordination Group made up of liaison officers from DoD components and other federal agencies, including DHS. Additionally, the Army Corps of Engineers, which is independent of the ASD/HD and NORTHCOM, performs some disaster response actions, such as the repair of damaged levees, as part of its on-going mission of water navigation maintenance and flood control (5).

It should be noted that the use of National Guard personnel for emergency response is not normally considered to be DoD support. The National Guard is both a state and federal organization. Unless federalized, the National Guard operates under the control of state and territorial governors, who can order Guard personnel to full-time "state active duty." As a state resource, they often perform a spectrum of disaster relief tasks, including emergency law enforcement since they do not fall under the provisions of the Posse Comitatus Act, which generally forbids use of the Army or Air Force to enforce domestic laws. State-controlled Guard personnel may also be "loaned" by their governors to assist in other states. Likewise, use of the U.S. Coast Guard, though it is a military organization, is not considered military support, as the service is part of DHS, not DoD.

The most dynamic and often-required part of the NDMS mission is that of medical response. NDMS has created response teams of medical and health professionals that can rapidly deploy and establish self-sustaining field operations until additional federal support arrives (33). Over 7,000 private sector medical, mortuary, veterinary, and support personnel are organized into 104 teams dispersed across the nation. These include 50 Disaster Medical Assistance Teams (DMAT); 4 Burn Specialty Teams; 3 International Medical Surgical Response Teams (IMSuRT) that also respond to domestic events; 10 National Pharmacy Response Teams; 10 National Nurse Response Teams; 4 Veterinary Medical Assistance Teams; 10 Disaster Mortuary Operational Response Teams (DMORT); 2 Pediatric Teams; 1 Crush Medicine Team; 2 Mental Health Teams; 4 National Medical Response Teams for incidents involving weapons of mass destruction (WMD); 1 WMD Mortuary Team; and 3 Management Support Teams.

In practice, many of these teams are developmental or not staffed with a full complement of personnel. Only half of the DMATs are considered to be fully operational. It is also expected that team personnel from the area of a disaster may be unavailable because they will be otherwise employed or be victims. The 25 Level 1 DMATs can be launched with 4-6 hours notification and can be operational in as little as 12 hours, depending upon the distance they must travel and the surviving transportation infrastructure. Deployed DMATs are expected to rotate on a 14-day cycle, with physicians rotating on a 7-day schedule, therefore teams may be deployed multiple times for one disaster (12). The Public Health Bioterrorism and Public Health Emergencies Act of 2002 (Public Law 107-188) provides for federal licensure of team

members and protection under the Federal Tort Claims Act and the Uniformed Services Employment and Reemployment Rights Act, so these “intermittent federal employees” have many of the same rights as do mobilized military reservists.

The definitive care mission of NDMS is principally met through a system of Federal Coordinating Centers (FCCs) that identify NDMS hospital beds available nationwide to accommodate wartime casualties or inpatients evacuated from the area of a disaster. This system evolved directly from the Civilian-Military Contingency Hospital System (CMCHS) developed by DoD and the VA in the late 1970s to find space in civilian hospitals to care for a minimum of 50,000 military casualties that could be expected to be generated by a conventional war with the Soviet Union and Warsaw Pact (46). Responding to a decline in military hospital beds from over 400,000 in World War II, to about 57,000 at the height of the Vietnam Conflict in 1969, to about 18,000 in 1985, CMCHS met its 50,000-bed target through pledges from more than 700 participating hospitals in 48 metropolitan communities. Today, with the added domestic disaster relief mission, the DoD and VA-operated FCCs have continued to use an approach of enrolling large hospitals clustered in metropolitan “receiving areas.” As of 2006, 62 FCCs coordinated 1,656 NDMS participating hospitals in 82 receiving areas, pledging a minimum of over 34,000 beds (29).

The National Response Plan

In December 2004, DHS issued the National Response Plan (NRP) to document federal policy for disaster relief and consequence management. Its purpose is to provide a consistent national framework with which to standardize management practices and procedures to ensure that different levels of government can work

together effectively to prepare for, respond to, and recover from domestic “incidents” (and especially “Incidents of National Significance”). The NRP is the successor to the Federal Response Plan, first promulgated in 1992, (which did not incorporate the roles of state and local governments) and a series of predecessor plans developed in the 1980s for response to a catastrophic earthquake (37). The NRP establishes the framework under which federal and voluntary agencies are instructed to operate. It is an administrative plan and does not establish any federal authority in itself. Again, it emphasizes that federal responsibilities are to assist state and local authorities, not to replace them (33). The NRP adopts an all-hazards approach to domestic incident management, covering natural and man-made disasters to include acts of terrorism. This approach develops processes, such as notification procedures, that can be applied across all types of events and uses incident annexes to lay out hazard-specific activities that need to be undertaken. This simplifies the planning and practicing of disaster response activities, so that when a disaster does occur, the various parts of the response system will have an easier time working together.

Like the precursor plans, the NRP attempts to deal with an essential difficulty in the coordination of federal activities during disasters that has repeatedly challenged government response efforts. Federal disaster response capabilities and responsibilities are distributed among a large number of agencies. The NRP documents disaster relief responsibilities assigned to 29 different federal agencies. To deal with this complexity, the NRP organizes the mission into fifteen “emergency support functions” (ESFs), each assigned to an interagency work group with one or more agencies appointed as the lead (37). The plan is in effect on a full-time basis, not

just during emergency operations, but implementation is meant to be flexible and scalable (7). The coordination problem is still formidable, however, as the plan calls for 15 different groups to control the work of 29 agencies. The magnitude of this task places a high premium on leadership and management ability (37).

The NRP assigns HHS as the primary agency and coordination authority for Emergency Support Function #8, Public Health and Medical Services. Fourteen federal organizations (ranging from DHS to the U.S. Postal Service), plus the American Red Cross, are listed as support agencies. The scope of ESF #8 is defined as providing "supplemental assistance to State, local, and tribal governments in identifying and meeting the public health and medical needs of victims of an Incident of National Significance." Mission tasks include assuring the safety of food, water, and environments; providing needed medical supplies, equipment, pharmaceuticals, and blood products; treating the ill and injured; patient evacuation; and fatality management. HHS coordinates activities with other ESF primary agencies as required (for example, with the Department of Agriculture, the primary agency for ESF #11, Agriculture and Natural Resources, for outbreaks of zoonotic disease) under the overall leadership of DHS.

HHS does not bear prime responsibility for mass care, which is the coordination of non-medical services such as food, shelter, emergency first aid, and reunification of families. Mass care is the responsibility of DHS and is assigned by ESF #6 to FEMA. Neither is HHS responsible for urban search and rescue, which falls under ESF #9 and again is the responsibility of DHS. It is assumed that HHS may depend on other agencies to perform their own ESF responsibilities (e.g., road clearing, public safety,

power restoration) that are necessary before some ESF #8 activities can be completed (33).

ESF #8 Resources

To meet its ESF #8 responsibilities, HHS draws upon its internal resources and makes requests of the support agencies (including the capabilities of NDMS when, from 2003 to 2006, it was part of DHS). Internal assets include Federal Medical Stations (FMS), the U.S. Public Health Service (PHS) Commissioned Corps, and after January 1, 2007, NDMS.

The PHS Commissioned Corps, one of seven U.S. uniformed services, is made up entirely of officers with health-related training. These officers are employed by agencies within and outside HHS to provide various healthcare and related services. The HHS Secretary has authority to deploy the Corps in response to public health emergencies, and the Commissioned Corps Readiness Force (CCRF) was created in 1994 to enable this. The first large-scale deployment of CCRF officers was in response to the September 2001 terror attacks. In July 2003 the HHS Secretary announced plans to improve the response capability of the entire PHS Corps and, according to the HHS Inspector General, the Corps has since been engaged in a continuous effort to do so. In January 2006, the HHS Secretary announced the latest phase in this effort, in which the Corps would increase in size by ten percent, to 6,600, create a team-oriented deployment process, and implement a tiered response plan, which will include a Rapid Deployment Force that can be ready for departure within 24 hours of notification (32).

The 20 existing HHS Federal Medical Stations have a bed surge capability of 5,000 beds; the department has an eventual goal of a 30,000 bed capacity. An FMS

provides rapidly deployable health and medical care to patients who have non-acute medical, mental health, or other health-related needs that do not need hospitalization but cannot be provided for in the general shelter population. This could include patients who have been quarantined and need observation, or those with chronic conditions requiring assistance with the activities of daily living or a need for medications and vital sign monitoring. The FMS allows a flexible response through its scalable and modular design. They are sited in appropriate buildings of opportunity and may be staffed with personnel from a variety of sources, including the PHS Commissioned Corps and the VA.

Another resource available to HHS is the Medical Reserve Corps (MRC) that is operated under the supervision of the Surgeon General. The MRC was founded in 2002 as part of Citizen Corps to establish teams of local volunteer medical and public health professionals who can contribute their skills and expertise throughout the year and during emergencies. MRC units are community based and focused, but units or individuals may volunteer to serve outside their local area in times of need. During the 2005 hurricane system, almost 200 volunteers from 25 MRC units were activated by HHS, and more than 400 volunteers were activated to support American Red Cross disaster operations in Gulf Coast areas. As of March 2007, there were 644 MRC units with over 121,000 members. (36)

The largest available source of assets is the DoD, the “last resort resource” that HHS can potentially draw on as a support agency for ESF #8. The military services have over 86,000 uniformed and 44,000 civilian medical personnel, sophisticated medical centers, hundreds of medical and dental clinics, specialized laboratories, field

hospitals, and the training and organization to deploy in any environment. Their transportation capabilities are unmatched (but not unlimited (60)), particularly for the evacuation of patients. DoD operates its own fleet of cargo and passenger planes, most of which were specifically designed to be easily outfitted for aeromedical evacuation. Additionally, it can activate the medical component of the Civil Reserve Air Fleet, which can configure Boeing 767s with 87 litters each within 72 hours. The problem, of course, is that there are many other demands for all these capabilities, including the worldwide care of over nine million medical beneficiaries and, presently, the requirements of providing forward-based medical support in wartime environments. The availability of military assets is often overestimated by emergency preparedness planners, who would be well advised to not consider military support as an easy solution to their needs.

The Crucible: Hurricanes Katrina and Rita

Nine months after the promulgation of the NRP, the disaster response system that it envisioned was put to a severe test as Hurricanes Katrina and Rita devastated the Gulf Coast. On August 29, 2005, Hurricane Katrina made landfall in Louisiana as a Category 3 storm, causing an estimated $81 billion in damage and 1,833 deaths. On September 24, Hurricane Rita made landfall between Texas and Louisiana, also as a Category 3 storm, causing estimated total damage of $10 billion and at least 62 deaths (31). Hurricane Katrina caused catastrophic wind damage and flooding in several states and inundated New Orleans, one of the nation's historic cities. Hundreds of thousands of people in three states were dislocated. (37)

In a February 2006 letter to Congress, David M. Walker, the Comptroller General of the United States, said: "Unfortunately, many of the lessons emerging from the most recent hurricanes in the Gulf are similar to those GAO identified more than a decade ago, in the aftermath of Hurricane Andrew, which leveled much of South Florida in the 1990s." The February 15, 2006, report of the U.S. House of Representatives Select Bipartisan Committee to Investigate the Preparations and Response to Hurricane Katrina said: "The preparation and response to Hurricane Katrina show we are still in an analog government in a digital age."

As in the case of Hurricane Andrew and earlier catastrophic storms, the disaster relief system was initially overwhelmed. Further, the system seemed to take longer to catch up. The issue that received the most attention afterward was the slowness of the rescue and relief operations (37). In fairness, many of the problems were caused by the sheer scale of the event. At landfall, Hurricane Katrina had a diameter of more than 200 miles, so it immediately hit a large area in Louisiana and Mississippi before moving into Alabama and ultimately affecting more than 90,000 square miles (5). The most devastating effects, moreover, were the multiple levee breaches and consequent flooding of New Orleans, which did not become apparent until the storm had mostly passed that area. The resulting breakdown in state and local efforts left too big a gap for the federal system to fill.

The NRP contains provisions for the accelerated, proactive federal response to a catastrophic event that "results in extraordinary levels of mass casualties, damage, or disruption severely affecting the population, infrastructure, environment, economy, national morale, and/or government functions[;] . . . could result in sustained national

impacts over a prolonged period of time; that almost immediately exceeds resources normally available to State and Local authorities." These provisions, from the NRP's Catastrophic Incident Annex, can be implemented only by the DHS Secretary or his designee. The annex assumes that for a catastrophic incident: "Federal support must be provided in a timely manner to save lives, prevent human suffering, and mitigate severe damage. This may require mobilizing and deploying assets before they are requested via normal NRP protocols." Even so, the annex also contains instructions such as the following: "Federal resources arriving at a federal mobilization center or staging area remain there until requested by State/local incident command authorities, when they are integrated into the incident response effort."

Attempts were made to prepare for and to respond proactively to Hurricane Katrina. After the storm crossed Florida on August 25, 2005, it spent some days in the Gulf of Mexico building into a Category 5 hurricane. NORTHCOM issued its first warning orders to its Regional Emergency Preparedness Officers, State Emergency Preparedness Officers, and Senior Army Advisors to the National Guard on August 24. DoD began to move ships and made plans to deploy personnel into the area (5). On 26 August, PHS personnel began to deploy to the area, as did the first NDMS DMATs (32, 58). The Governor of Louisiana declared a state of emergency on August 26, and the Governor of Mississippi did the same on August 27 (33). On August 27, NORTHCOM began to deploy the forward elements of what was to become Joint Task Force-Katrina (JTF-Katrina). FEMA arranged for the prepositioning of over 11 million liters of water, 9 million pounds of ice, and 5.9 million MREs ("meals ready to eat"). Over two dozen response teams from various agencies were situated in neighboring states, ready to

move in after the storm (37). The Mayor of New Orleans called for a voluntary evacuation of the city on August 27, changing this to a mandatory evacuation a day later. President Bush declared a state of emergency for Louisiana on August 27 and, after the storm's landfall, issued major disaster declarations for Louisiana, Mississippi, and Alabama on August 29 (58). On August 30, JTF-Katrina was officially activated, and that evening, after the levee breaches around New Orleans became apparent, the DHS Secretary declared Hurricane Katrina an Incident of National Significance (37). He never declared it a catastrophic incident (19).

On August 31, the HHS Secretary separately declared public health emergencies in Alabama, Florida, Louisiana, and Mississippi. Such a declaration, under Section 319 of the Public Health Services Act, had only been used once before in recent times—after the September 11, 2001, terror attacks (33). The declaration allows the Secretary to take broad action to protect public health, including making grants and contracting as necessary, though it does not specifically give authority to supersede and assume the states' public health responsibilities. On September 4, as thousands of evacuees from New Orleans began arriving in Texas, the HHS Secretary declared a public health emergency in that state, followed by declarations for the host states of Arkansas, Colorado, Georgia, North Carolina, Oklahoma, Tennessee, West Virginia, and Utah on September 7 (33).

DoD activity in support of the disaster relief effort increased as the seriousness of the situation was recognized. By August 31, Air Force transports had begun NDMS aeromedical evacuation from the affected area. Also on that day, the amphibious assault ship USS Bataan, with a 600 patient medical capacity and its own transport

helicopters, arrived off New Orleans. On September 1, the 82nd Airborne Division, in North Carolina, and the 1st Cavalry Division, in Texas, were placed on alert. The 5,200 Soldiers from these units began deploying on September 3 and had arrived in the area by September 5. By September 6, the amphibious assault ship USS Iwo Jima and the aircraft carrier USS Harry Truman had also arrived. A September 7 press release from NORTHCOM indicated that it had 17,417 active duty personnel, 20 U.S. ships, 360 helicopters, and 93 fixed wing aircraft in the affected area. Additionally, the Coast Guard deployed to the area about 4,000 personnel, 37 aircraft, and 78 boats of various sizes, which were a key contribution to the rescue of residents stranded by flood waters.

National Guard Personnel from every state in the union, Puerto Rico, and the U.S. Virgin Islands arrived to join in the effort. By September 8, there were 30,255 activated Guard personnel in Louisiana, 23,476 from outside the state, and 15,569 activated Guard personnel in Mississippi, 11,506 from outside the state (5). After much discussion and negotiation with the state governors, it was decided not to federalize the National Guard or to place them under DoD control. On September 7, however, the National Guard personnel were retroactively approved for Title 32 status, dating back to August 31, so that they could receive federal pay and allowances.

Perhaps the most important tasks performed by the National Guard were to restore order and to rescue stranded residents, particularly in New Orleans. The city's mandatory evacuation had gone surprisingly well, as 1.2 million persons speedily evacuated the city and its environs (37). There was great difficulty, however, in trying to evacuate individuals without their own cars, the city's hospitals were not included in the mandatory order, and many persons simply chose to remain. The mayor announced

that school buses would take residents to shelter, but once the storm hit there were few working buses and even fewer drivers available (37). After the levees broke, the tens of thousands who had not evacuated were unable to get out on their own. The Superdome was meant to shelter limited numbers for a short period of time, that is until the storm had passed over and they could return home or be taken elsewhere. Instead, about 30,000 people were stranded at the Superdome without air conditioning, adequate supplies, or much organization, most of them for three days. Another 20,000 were at the New Orleans Convention Center. The New Orleans Police Department was struck by massive personnel absences and equipment losses and was unable to perform the huge tasks it was assigned. It took four or five days for the National Guard, with what remained of the police, to restore order to the city (37).

NDMS Evacuations

In the face of these conditions, the NDMS partners conducted the first large-scale execution of the patient movement and definitive care missions of NDMS. For Hurricane Katrina, over 1,900 NDMS evacuees were transported from New Orleans Airport to nine FCC patient reception areas. The aeromedical evacuation flights began within 24 hours of mission assignment by DHS, and approximately 70 flights, mostly by military transports, were completed within five days. For Hurricane Rita, over 900 NDMS evacuees were transported from south Texas to ten FCC reception areas in the two days before the storm made landfall, using 20 aeromedical missions executed by DoD, the Coast Guard, and the National Guard (38). Not everything went smoothly.

NDMS response teams that initially deployed to New Orleans Airport were predominantly clinical personnel focusing on triage and medical care rather than patient

evacuation operations. There was no NDMS Management Support Team and accordingly no integrated command, control, or communications among the medical personnel dedicated to evacuating patients. (38) Medical personnel were unable to document or roster patients, or initiate more than rudimentary medical records before patients' departure. Patient movements were not entered into tracking systems and aircraft manifests were not completed. FCCs were frequently uninformed of when aircraft would be arriving, causing their reception teams sometimes to be hastily dispatched and sometimes to sit idle at the airport. There was no single NDMS patient movement manager. Initially, there was no integration between flights being operated by the Coast Guard, Navy, Air Force, and National Guard and no coordination of the air missions with the ground evacuations conducted by the state. A DoD Joint Patient Management Team, Aeromedical Evacuation Liaison Team, and Mobile Aeromedical Staging Facility did not arrive until two days after mission assignment. (38)

The FCC reception areas (eight VA and one DoD for Hurricane Katrina; nine VA and one DoD for Hurricane Rita) had difficulties as well. The FCC patient reception teams were not funded before being activated and therefore had limited initial resources to support airfield operations. Some reception teams had little or no training or experience with working safely around aircraft. Some teams underestimated the need for translators, security, the means to manage personal effects, and personnel to provide mental health, chaplain, and social services. Equipment shortages ranged from litters and wheelchairs, to medical regulators and oxygen, to blankets and diapers. About thirteen percent of persons transported to FCC patient reception areas had no medical requirements, but there was often no place to house them. Further, the

contract to process NDMS hospital claims had been terminated by DHS in 2004, leaving no mechanism to ensure the reimbursement of hospitals or other facilities that accepted patients. Finally, there was no system to return patients still needing care to their home areas. (HHS eventually expedited a contract with CareFlite Corporation to conduct repatriation operations.) (38)

The patients being evacuated came largely from New Orleans area hospitals that had flooded or been so severely damaged that they could not remain operational. Hospitals in Louisiana and Mississippi had planned to remain open during the storm, as is the usual practice for these facilities during time of disaster. Hospitals are by design and their very nature generally well-equipped to withstand the affects of weather. Most are equipped with their own backup electrical systems and generators with reserves of fuel. They have emergency stores of pharmaceuticals and medical supplies, and food and water for the staff and patients. Many of the Gulf area hospitals had pre-selected storm teams who were expected to be ready to stay three or four days before being relieved by the regular staff. Sleeping and feeding arrangements were made for the staff that remained and some were even allowed to bring pets or family members (19). Hospital administrators say that they feel an obligation to remain operational because that is how they can best care for their inpatients and because they expect to be needed during and after the disaster to care for victims. The staff at a 153-bed Mississippi hospital, for example, treated approximately 500 patients per day immediately after Hurricane Katrina, compared to their usual average of 130 patients per day (19). An operational hospital is certainly a key community resource.

The flooding in New Orleans affected community hospitals and renowned medical centers alike. In most cases, the flooding occurred quite suddenly as levees failed and areas were covered with as much as 24 feet of water. Many had great difficulty evacuating their patients. In some hospitals, patients had to be carried up fire escapes to be helicoptered off the roof or down to waiting boats. Fire fighters and some members of the overwhelmed New Orleans Police Department provided what help they could, but the hospital staffs were clearly not prepared for such an enormous task. Transporting the patients became a key difficulty. Even where ground transportation could get through and when communications had not broken down, facilities found themselves competing for the same pool of vehicles. Nowhere in the NDMS planning documents were there provisions for the federal government to supply short-distance transportation assets, such as ambulances or helicopters, to move patients out of healthcare facilities to mobilization centers, such as the airport. It had always been considered a state or local responsibility to get the patients to the sites of the NDMS areomedical evacuation (19). The vehicle shortages and communication failures that plagued the New Orleans relief effort magnified the coordination difficulties faced by the evacuation teams at the airport (38).

Federal Medical Stations

Starting in 2004, HHS and DHS began development of the Federal Medical Contingency Stations (FMCS) concept. Originally, different types of FMCS were envisioned, ranging from a field hospital delivering advanced medical and surgical services to units to be located in existing buildings and designed to provide hospital bed-surge capacity for non-acute patients. By Summer 2005, there existed only a

prototype of the later sort, which was not designed to be a stand-alone asset. The assumption was that this FMCS would serve as a low-level ward for patients who could be safely discharged from a hospital but were too sick to go home or to a general shelter. Each 250-bed module would have about 250 staff, working in 12-hour shifts, likely drawn from the PHS Commissioned Corps, DoD, VA, and/or the Medical Reserve Corps (MRC). One prototype unit was essentially complete and three other units were in varying states of completion, lacking beds and significant amounts of supplies and pharmaceuticals. (49)

When Hurricane Katrina struck, HHS decided to immediately send what FCMS material was available to support a state-run medical operation in Baton Rouge, Louisiana. HHS decided to alter the capability of the FMCS to more of a medical needs shelter mission and change the name to Federal Medical Station (FMS). HHS then moved quickly to procure FMS packages and to proactively push them to the affected area, without waiting for a state request. This is the proactive approach envisioned in the Catastrophic Incident Annex of the NRP. Even though the DHS Secretary never invoked the Annex, the dismal communications with state officials early in the disaster led many federal agencies, including HHS, to adopt a “push” approach. (49)

About 2,500 FMS beds were ultimately sent to military installations near the disaster area. Most of the supplies were sent directly from the vendors and not organized into packages. The military installations were intended primarily as staging areas for the FMSs, but this was not well communicated to the federal personnel who were sent to staff them. The FMSs were therefore set up in place, before the need for

them was identified. About 1,130 beds were set up, but only one FMS on a military site actually functioned, with a total count of just 48 patients (49).

The impending arrival of Hurricane Rita prompted HHS to deploy the FMSs again, and this time they functioned more effectively. Hurricane Rita struck an area that was already burdened with hundreds of thousands of evacuees from Hurricane Katrina. Approximately 2,000 FMS beds were sent to the affected area, and about 625 beds were set up in three sites in Texas—the Texas A&M's veterinary Large Animal Hospital, and to recently closed VA hospitals in Marlin and Waco. These FMS beds were nearly all filled with medical needs patients and their families or caregivers (49). A major reason for the success of this effort was that facilities were established where there was a need to accommodate evacuees but not in the area that had actually been devastated. This allowed vendors to make deliveries right to the sites and even to send representatives to determine needs. Notably, all emergency requests for FMS medical supplies and pharmaceuticals were met in a timely fashion.

The FMSs established on military bases to support Hurricane Katrina were not successfully utilized for a number of reasons. They were too far away from the disaster area for state resources to deliver patients to, and there was reluctance by many persons who had failed to evacuate to leave their home communities after the storm had passed. Further, few of the on-scene federal personnel had much knowledge of the FMS resource, as it was put together "on the fly." In searching for other appropriate sites, FMS had to compete for large existing buildings that were in short supply and high demand. In the end, much of the FMS material was used to support state-run operations. (49)

Among the most important lessons learned from the FMS operations for Hurricanes Katrina and Rita were the types of patients that needed care after this kind of disaster. While the storms did not cause a large number of casualties, they exacerbated the suffering of chronic illnesses through the difficulty in obtaining medical services (e.g., dialysis) and medication. The most common medical problems of FMS patients were diabetes (27%), hypertension (23%), respiratory diseases such as emphysema and asthma (25%), and orthopedic conditions (18%). Most patients sought care for multiple conditions and had been without medications for several days. More than a third of patients required care for mental or behavioral conditions such as depression (29%), anxiety (25%), and/or schizophrenia/psychosis (21%), higher numbers than expected. The pharmaceutical caches were not originally designed for this kind of patient population and did not have many of the medications needed to control chronic pain and other conditions. Re-supply came directly to the FMSs from wholesalers without being first organized into functional kits. (51)

The FMS sites were staffed by more than 500 officers of the PHS Commissioned Corps, as well as VA and MRC personnel, and volunteers. While this provided sufficient numbers of physicians and registered nurses, there were shortages in the clinical staff needed for low-level care, such as licensed practical nurses and nurse assistants, as well as mental health providers and social workers. Since FMS was still a prototype, few of the staff understood its capabilities or requirements and had to learn, as they worked, even such basic doctrine as what patients to accept. (49)

Overall, more than 2,000 members of the PHS Commissioned Corps were deployed to participate in the hurricane response operations (54). Additionally,

emergency operation centers (EOCs) were activated at HHS headquarters and at various HHS agencies. The EOCs were staffed around the clock, electronically connected with each other and with the Homeland Security Operations Center. The Centers for Disease Control and Prevention (CDC) established a website to provide information to the public, healthcare workers, and cleanup workers; sent more than 150 staff to affected states; and deployed the Strategic National Stockpile of pharmaceuticals and medical supplies. The National Institutes of Health set up a phone-based consultation service for healthcare providers treating hurricane victims and mobilized bed capacity within its medical system. The Substance Abuse and Mental Health Services Administration established a crisis hotline and provided grants to state mental health agencies (33). The total federal role in providing medical services to the hurricane victims was unprecedented in its size, scope, and variety. It was not, however, without its critics.

After the Storm

The public perception was that the federal disaster response to Hurricane Katrina was muddled and inadequate (45). To a large degree, this was a repeat of the same kind of criticism that was made after other catastrophic events, including Hurricanes Hugo and Andrew. It also reflected heightened expectations of what is expected from the U.S. government, which have persistently increased over the years and especially so after the terror attacks of September 11, 2001. (37) It could be rightfully said that the Homeland Security Act of 2002 created DHS, and gave it assets such as FEMA and NDMS, so that it could deal with just this kind of domestic disaster. In the same way as

perceived lapses in the response to other disasters had prompted legislative changes, there was a call after Hurricane Katrina for new measures and reforms.

Several such acts were passed by the 109th Congress, including the Post-Katrina Emergency Management Reform Act of 2006 (Post-Katrina Act) (Title VI of Public Law 109-295) and the Pets Evacuation and Transportation Act of 2006 (Public Law 109-308). Another, signed on December 18, 2006, was the Pandemic and All-Hazards Preparedness Act (PAHPA) (Public Law 109-417). Originally meant to reauthorize the programs established by the Public Health Security and Bioterrorism Preparedness and Response Act of 2002 (Public Law 107-188), its content was shaped by concerns about the public health and medical response to Hurricanes Katrina and Rita and new worries about the nation's preparedness for a possible pandemic of a human variant of avian influenza. PAHPA amends the Public Health Service Act to require the HHS Secretary to lead all federal public health and medical response to public health emergencies and incidents covered by the NRP. (Though this was already set forth in ESF #8 of the NRP, the Senate Report for the bill indicates that Congress was concerned that there was ambiguity about this matter and felt it was vital to clarify the leadership roles and to ensure unified command and control during a public health emergency (45).) PAHPA establishes a new HHS Assistant Secretary for Preparedness and Response (ASPR), transferring the responsibilities of the Assistant Secretary for Public Health Emergency Preparedness and adding oversight of the advanced development of countermeasures and management of the Strategic National Stockpile (which had been transferred to DHS under the Homeland Security Act of 2002 and back to HHS by the Project BioShield Act of 2004 (Public Law 108-276)). PAHPA

reauthorizes $1 billion a year in grants for state and local public health emergency preparedness and makes political subdivisions of states and consortiums of states eligible for funding. NDMS was returned from DHS to HHS, which is required to review the system and its ability to provide medical surge capacity. The act specifically adopts an all-hazards approach to emergency health and medical readiness, strengthens medical surveillance programs, encourages growth of the volunteer community-based Medical Reserve Corps, and calls for the linking of systems that verify medical credentials to increase the response capacity of healthcare professionals from other states. It authorizes the VA to provide logistical and training support for NDMS and to support HHS during public health emergencies or incidents under the NRP.

The Pandemic and All-Hazards Preparedness Act places new emphasis on the use of information systems to report and compare a variety of relevant information in a timely manner across jurisdictions. It requires HHS to establish a national electronic network for sharing of public health surveillance information in near-real time, and authorizes grants to states to establish or operate systems in this network. The act also requires HHS to establish a nationwide system to track influenza vaccine, and to identify ways to expand telehealth capabilities for emergency response. The implementation of these information technology initiatives will not be without challenge. Achieving near-real-time national information systems for disease detection or resource tracking will be complicated by the need to develop a common set of data standards to serve multiple purposes, while also addressing concerns about the privacy of personal health information and commercially sensitive information. (34) Though web-based

information networks hold great promise in sharing the information needed to coordinate the many pieces of medical response, their success is certainly not guaranteed.

The new legislation increases leadership and oversight of the nation's public health preparedness by integrating top management of multiple public health preparedness programs. It designated a single senior health official—the ASPR—to be in charge, accountable for public health programs, and focusing on a coordinated national preparedness strategy within HHS. The ASPR is directed to enter into interagency agreements to assume operational control of the emergency public health and medical assets of other federal departments, except for DoD. HHS is also required to establish evidence-based benchmarks and performance measures for emergency preparedness, which grant recipients, such as state agencies, must meet to be eligible for funding.

The decision to transfer NDMS back to HHS, effective January 1, 2007, was prompted by Congressional and White House investigations studying the response to Hurricane Katrina that found, among other problems, that NDMS deployments were made by FEMA without the knowledge or involvement of personnel at HHS (34).

Without really weakening DHS's control of the overall federal disaster response operations, PAHPA strengthens and clarifies the unity of medical response to disasters. Indeed, DHS had recognized the disunity of vision and control that existed in this area and the need for medical professional leadership when they created position of DHS Chief Medical Officer (CMO) in 2005. Unfortunately, this further confused the division of responsibility between DHS and HHS. Members of Congress wanted to clarify the relationship between the CMO and the Secretary of HHS in disaster preparedness and

response. (34) A provision in the Post-Katrina Act provides that the DHS CMO "shall have the primary responsibility *within the Department* for medical issues related to natural disasters, acts of terrorism, and other man-made disasters" (emphasis added). The Pandemic and All-Hazards Preparedness Act, by providing that the "Secretary of Health and Human Services shall lead all *Federal* public health and medical response to public health emergencies and incidents covered by the National Response Plan" (emphasis added), resolves the ambiguity and places the HHS Secretary and ASPR in clear control of public health and medical preparedness and response.

It should be noted, however, that DHS is still involved in medical related matters, even beyond their role as the central coordinator for disaster relief operations. The Metropolitan Medical Response System (MMRS), which assists larger cities with developing and operating their own capacity to respond to a mass casualty event, is part of DHS's "one-stop-shop" operation for assisting city emergency planners. This program was created in 1996 in response to the Tokyo subway poison gas attack by Aum Shinrikyo and the Oklahoma City bombing of the Alfred P. Murrah Building. It promotes linkages among first responders, medical facilities, public health and emergency management agencies, and volunteer organizations. It encourages planning and integration with neighboring jurisdiction, state, and federal agencies. (14) This program was transferred from HHS to DHS in 2003 and was not among the programs returned there by the Pandemic and All-Hazards Preparedness Act. By DHS's own assessment, MMRS lacks central medical oversight and integration into an overall national medical response strategy (35). Though the MMRS program remains in

DHS, coordination with HHS is required so that it adheres to the policies and performance measures that HHS is preparing to guide preparedness activities.

Building Response Capability

HHS is now growing in size and responsibility. The challenge is for this growth to be wisely managed. With NDMS back within the department, it needs to be intelligently integrated into the ESF #8 function and not remain a stand-alone program. Opportunities now exist to coordinate the makeup, training, and operations of medical response teams from NDMS, the PHS Commissioned Corps, and the Medical Reserve Corps, as well as teams from other federal agencies, such as the VA, and state teams. Investments in effort and technology should be made to institutionalize the sharing of information between programs and between the federal and state efforts. HHS must find ways to turn its ability to mount a direct federal medical response into a well-organized and practiced capability. The most effective way to do this will be to strengthen the deployability and performance of the PHS Commissioned Corps and the NDMS response teams.

The transformation of the readiness and response structure of the PHS Commissioned Corps, announced in early 2006, is a good step in this direction. This change is creating dedicated, equipped, and readily deployable PHS Commissioned Corps response teams and a multi-tiered response capability. The top tier will contain five Rapid Deployment Force (RDF) teams, each consisting of 105 multidisciplinary healthcare providers. One team will be on-call and ready to deploy within 12 hours of notification. One of the prime missions of the RDF will be to staff the updated FMS units, so that one RDF team can staff a 250-bed FMS, when augmented by personnel

not available in the PHS Commissioned Corps, such as nurse assistants, respiratory therapists, and housekeepers. A key strength of the teams will be an organic command and control element modeled on the Incident Command System. Officers in this role will have no clinical responsibilities during deployment, so they may focus on leadership, operations, planning, and logistical support for the mission (49).

Another good step towards a more reliably effective response capability is the plan for more regular exercise and utilization of the DMATs and other NDMS response teams. The same should be done for the Commissioned Corps RDF teams as they gain operational status. Full teams need to deploy on a regular basis, either for practice or for real, if they are to get practical training in the application of their own doctrine and in teamwork. This could be accomplished through an increased tempo of deployments, with the federal teams being used more often, in less severe disaster situations than which they have been sent to in the past. Also, DMATs have been occasionally pre-deployed to support National Security Special Events, such as major athletic games, presidential inaugurations, and political conventions. This practice could be expanded to give NDMS teams and other response teams the chance to work together. Joint exercises should also be conducted that allow federal and state teams to practice the integration of their efforts. Whether participating in actual relief operations or in coordinated exercises, the medical response teams need more opportunities to develop experience, practice their procedures, and to work together.

More important than direct federal response capability, though, is the mission of strengthening state preparedness measures, as they will continue to be the largest and most important element of disaster preparedness and response. In the large majority of

incidents, the state and local governments will have complete responsibility for relief operations. In the rare event where there is a large federal response, the state's assessment of needs and its coordination of effort are just as vital. During Hurricane Katrina, it was the failure of the state communication and control function in Louisiana, as circumstances overwhelmed capability, that was most responsible for the slow and uncoordinated relief effort. Finally, in the even rarer, but rightly feared, case of a truly nationwide emergency, it will be the individual states that will have to deal with their own difficulties, as there will be no unaffected regions available to provide surge capacity or refuge. This is perhaps the most alarming aspect of a prospective pandemic. With its new authority, the task of preparing states and communities for these situations falls squarely on HHS.

An important way that HHS can strengthen both federal and state capabilities will be in the creation and use of new accountability and performance measures. A universal system of metrics will bring new order to a haphazard system, improve efficiency and coordination through the adoption of standardized language and methodology, expose weaknesses, and better identify resources. PAHPA requires states and localities, in order to be eligible for funding, to participate in regular drills and exercises and to report back to HHS on the strengths and weaknesses identified in such exercises, and the corrective measures taken to address the material weaknesses. HHS should evaluate and disseminate best practices and lessons learned through such activities. Additionally, PAHPA requires the development and application of evidence-based benchmarks and objective standards that measure levels of preparedness. The act's accompanying language recommends that HHS support public health systems

research, including that by the Agency for Healthcare Research and Quality (AHRQ), to develop these performance measures for local, state, and federal agencies. (45)

Re-looking the NDMS Federal Coordinating Centers

There is much other hard management work to be done. With NDMS now part of HHS again, there is a chance to reassess, and overhaul if necessary, the FCCs, which had their first large-scale use during the response to Hurricanes Katrina and Rita, and which are the primary mechanism for meeting the "definitive care" part of the NDMS mission. At a minimum, new management controls and increased oversight are needed. The FCCs, run by VA and DoD medical facilities, have little formal guidance and less accountability. HHS, with the other NDMS partners, should establish formalized, mandatory readiness status reports for the FCCs. Only then will planners be able to tell if the coordination centers are ready to do their jobs, if they are adequately recruiting and exercising area hospitals, and exactly what the availability of the beds pledged to NDMS really is. An illustration of how nebulous the FCC reporting picture can be is a comparison of the total number of "NDMS Available In-Patient Beds" given in the report for 5:30 PM on September 11, 2001—21,966 beds—and the number reported for 5:30 PM on September 12—32,261 beds (29).

A systematic reevaluation needs to be made of the entire FCC system. It should ask whether there are the right number of FCCs, in the right places, providing the right number and mix of beds. Presently, the system tracks bed availability in five different categories (critical care, medical/surgery, psychiatry, burns, and pediatrics), down from a previous thirteen categories. There should be an evaluation of the requirements for each of these bed types, with decisions made whether more capacity is needed for any

particular type and guidance to the FCCs as to what categories need more attention. Further, for this information about what kinds of beds are available in each metropolitan receiving area to be really useful for more than planning purposes, it needs to be readily available at the mobilization points from which patients are dispatched. There is little indication that, in the first large-scale use of the system, the staff at chaotic New Orleans Airport really considered the availability of different bed types when putting patients on aircraft to receiving FCCs. (38) In fairness, though, this may have been caused, or at least exacerbated, by the late arrival of the DoD Joint Patient Management Team and the absence of a NDMS Management Support Team.

Another concern is that the FCC system is designed only to find "definitive care" hospital beds. It does not identify or track beds in facilities that can provide long-term nursing care, for example. Thus, when the residents of nursing homes were evacuated for Hurricane Katrina (usually, after the storm) and Hurricane Rita (usually, in anticipation of the storm) there was no federal plan to assist in finding alternative locations for their care. FCC teams had to scramble to find beds for the nursing home patients who nevertheless arrived in their receiving areas.

Indeed, it is time to reassess both the mission and capabilities of the FCC system. Is it more than a Cold War relic? Do the criteria for choosing metropolitan receiving areas and the types and sizes of hospitals that participate still make sense, or are they based upon obsolete assumptions and historic accident? Is the FCC mission of providing care for returning war casualties still necessary? The answer to that question is that it almost certainly is not.

As noted earlier, NDMS's predecessor, CMCHS, was created in the 1970s and early 1980s to find 50,000 civilian beds for the mass casualties that might come from a conventional overseas war. Indeed, some skeptics argued that the predicted number and type of casualties showed the Pentagon was preparing for a limited nuclear war (46). In the intervening years, the nature of the potential foe has changed (the Soviet Union and Warsaw Pact are no more), the size of the U.S. military has been dramatically reduced, and the very means of fighting wars has changed so radically that predictions today of such huge numbers of casualties would be unrealistic. Additionally, the military health system has been transformed, so that it now relies heavily on private civilian providers, but supplied through its TRICARE network on a regular contract basis. If the capabilities of that contract network should ever be exceeded, the backup system is established by the VA/DoD Health Resources Sharing and Emergency Operation Act (Public Law 97-174), authorizing the VA to provide medical service to members of the armed forces during wartime and national emergencies, and through a longstanding VA/DoD Contingency Memorandum of Understanding (MOU). On the basis of the MOU, the VA annually projects the number and type of beds available for active duty personnel in a contingency situation, such as a war. In August 2004, for example, the VA reported that 2,945 beds were available for military personnel within 24 hours, 4,618 beds in 72 hours, and 6,035 beds in 30 days. Indeed, the VA has committed to turning away much of its regular patient load if necessary to accommodate war casualties (20). Even though the U.S. is presently in its fifth year of fighting wars in Afghanistan and Iraq, however, it has never invoked the VA/DoD Contingency MOU to use the VA system. Nor has DoD even had to execute its own emergency plans to

rapidly expand capacity at pre-selected military hospitals using assigned Reserve medical units. Existing military medical facilities and the TRICARE contract are routinely absorbing all war casualties returning from Iraq and Afghanistan. The NDMS capacity is no longer needed or relevant for the care of war casualties.

Serious consideration should be given to dropping DoD involvement in the operation of FCCs. The VA already operates about two thirds of the coordinating centers and thirteen of the fifteen FCCs that received patients during Hurricanes Katrina and Rita (13). This is not to suggest that the number of FCCs should necessarily be reduced by a third, but rather that it makes more sense for the VA to assume the entire job, instead of splitting it with the three military services. In contrast to the VA, DoD has no approved funding for the operation of its FCCs, though it has requested budgeting of this unfunded requirement for many years (39, 56). DoD FCCs are primarily staffed by individual mobilization augmentees (IMAs), reserve component personnel who normally serve two weeks of active duty a year, and by staff from the military hospitals where they are located (53). Additionally, if the decision is made to add nursing home capacity to the FCC mix, the VA has experience in working with, even operating, this kind of facility, while DoD does not. The DoD will continue to be a large potential reserve of personnel and assets to respond to a national contingency, but it has no special need for or ability to perform the FCC portion of the NDMS mission and probably should be transitioned out of this role.

Disaster Response in the Changing Healthcare Landscape

It is, in fact, reassuring that the many injured service members returning from our current wars (over 24,000 as of March 2007 (21)) have not unduly stressed the U.S.

healthcare system. While this has certainly increased demands upon the DoD and VA medical systems, the civilian sector has comfortably accommodated the additional workload that the TRICARE network has received, both for the direct care of war casualties and through the shifting of other beneficiaries from care at DoD and VA facilities. Nor was the national system overwhelmed by the loss of so much healthcare capacity in the areas struck by Hurricanes Katrina and Rita and the evacuation of a large part of the region's population and patient load. The nation's hospitals and healthcare structure overcame the combination of these events despite the fears expressed by commentators.

Nevertheless, it is true that the drive for efficiency and the close management of resources have eliminated much of the surge capacity in the nation's healthcare structure. As new surgical procedures and an emphasis on same-day procedures have reduced the number of inpatients across the country, communities have reduced or eliminated their "unneeded" bed capacity. The growing prevalence of hospital systems and healthcare networks has reduced redundancy in facilities, equipment, and programs. In 2005, DHS estimated that more than 500 hospitals and 1100 emergency departments had closed in the U.S. in the previous decade (35). As in the rest of the economy, concepts such as "just in time delivery" have reduced stockpiles of supplies and working materials, including such items as on-hand pharmaceuticals. There is simply less idle capacity in the system and therefore less of a cushion to fall back upon in time of need.

Just as this reduction in excess capacity was largely caused by digital-age efficiency that allows the rapid transfer of resources to exactly where and when they are

needed, the same approach could be used to replace some of the surge capability that has been lost. If we cannot have sufficient reserves of facilities, equipment, and trained staff in every community, we will need to have quickly deployable regional or national reserves that can arrive "just in time." This will require close coordination of state, regional, and national emergency planners that is only possible through the proactive leadership of a centralized, integrated federal organization, i.e., the Department of Health and Human Services. The coordination effort must not rely upon the failed model of Soviet-style centralized planning, however, but rather the creation of a mutually supportive system that is unified through the multi-level sharing of information and synchronization of action that new technologies and management techniques make possible.

As the planning and oversight of these programs is increasingly integrated, their overlapping missions and requirements should become more apparent. This should allow a more accurate understanding of what resources are available. The problem of double-counted assets is prevalent throughout the system, and it can gravely confuse an operational picture. Several hospitals may plan to use the same set of ambulances without realizing they may be unavailable just when they are most needed. Medical specialists may belong to two or more different medical response teams, meaning that teams will be understaffed if they must deploy simultaneously. DoD's TRICARE network relies upon a network of civilian hospitals and providers to provide a reserve of capacity (including bed-space) for contingencies or unexpected needs. Many of these same hospitals participate in the FCC program, so their beds are pledged to NDMS. It may turn out that some of these same facilities have pledged capacity to the VA, to

state agencies, to their hospital network, and possibly to others. The biggest part of the problem is not the multiple pledging of the same resources, but rather the false picture that this gives to planners. Bringing various reporting systems together can resolve the double counting. A starting place might be the integration of NDMS FCC bed counts and the HHS burn bed tracking system into the AHRQ National Hospital Available Beds for Emergencies and Disasters (HAvBED) program, now in prototype (1). This could be more easily accomplished now that all these programs are under the HHS umbrella. Web-based information technology, such as HAvBED, shows great promise to increase efficiency and joint operating capabilities by giving operators a common view of situations and resources and by simplifying communications.

Conclusion and Recommendations

Major disasters, and the perceived weaknesses in the response to them, beget reform plans. Tropical Storm Agnes and the Three Mile Island partial meltdown prompted the formation of FEMA; Hurricane Andrew, the drafting of the Federal Response Plan; the Oklahoma City bombing, the creation of MMRS; the 2001 terror attacks, the creation of DHS and the National Response Plan; and Hurricanes Katrina and Rita, a multitude of measures to boost homeland defense and emergency preparedness, including the creation of the ASPR at HHS. Too often, the long period between these major incidents has allowed a loss of focus and the leaving half-done of promising new measures. One may hope, however, that the recent institutionalization of emergency preparedness planning within the federal government and in many states will maintain momentum for continuous strengthening of the national disaster response

system. DHS has stated a goal of creating a "culture of preparedness." The medical piece of this cultural change belongs to HHS.

The greatest effect that HHS can have on medical preparedness is to improve the capability of state and local entities to respond to disaster, both in their home areas and operating "on loan" to other jurisdictions. There will be times, though, when a direct federal medical response is also called for. Indeed, with growing societal and political expectations, a federal operational response will be demanded more often than before. NDMS, with its response teams, evacuation mission, and FCCs to coordinate bed space nationwide, gives HHS its most capable tool for mounting such a response. Other deployable assets that can provide surge capacity where needed are the Federal Medical Stations (especially if expanded as planned), the PHS Commissioned Corps RDF teams and, potentially, the Medical Reserve Corps program. These programs are still fragmented, though HHS now has control over each. They should be incorporated into an integrated, or at least very coordinated, effort.

To help NDMS to reach its potential as the centerpiece of federal medical response, there are some steps that can be taken to improve its efficiency and effectiveness. First, the capability of the DMATs and other NDMS response teams should be improved. Each team should be brought to full or near-full manning and the personnel retained together over a long enough period to become proficient in their doctrine and used to working together as team. These teams should be deployed on a regular (or at least, more than occasional) basis, either in exercises (as coordinated with state efforts as possible), in support of National Security Special Events, or in response to real-world disasters. Teams that are only partially manned and which rarely practice

together do not develop the group skills and experience that go beyond the mere collection of their individual professional qualifications. Further, the NDMS teams should strengthen their organic leadership/management elements by specifically dedicating individuals to the communications, control, planning, and management of the team, so that it can effectively work in coordination with other parts of the disaster relief system, even when conditions are chaotic, difficult, and confused.

Second, the network of FCCs should be overhauled, beginning with increased central management to guide individual FCCs and to hold them accountable for performing their work to a given standard. A thorough analysis should be made to determine how many beds are needed nationally to provide definitive care to patients that may be evacuated because of disasters, what type of beds are needed, and where they should be. This will determine whether the number of FCCs should be increased or decreased and which metropolitan areas they should operate in. It is time to re-look the decisions that were made in the 1970s and 1980s to see if they meet today's needs. FCCs should expand their focus beyond hospitals so they can also find bed space for patients needing long-term or short-term nursing care. They should also coordinate with state and local authorities and with FEMA to plan to shelter non-patients that arrive in NDMS evacuation missions in the company of patients.

Third, though the accommodation of war-time casualties was part of NDMS's original mission, this FCC task should be eliminated. The transformed nature of the military, the way that wars are conducted, and the disappearance of the Soviet Union and Warsaw Pact as potential foes make this capability unneeded and irrelevant. The military healthcare system has developed other ways to provide the backup capacity

that it may need in time of war, through its civilian network of providers and by the VA. Very serious consideration should also be given to ending the DoD operation of about a third of the FCCs. The VA is more suited to this role and the operations would benefit from being run by a single organization. DoD should remain a NDMS partner, but it should focus on the mission of medical evacuation.

Fourth, increased use should be made of information technology systems to coordinate effort, share information, and communicate between NDMS elements and other federal, state, and private disaster relief organizations. The information systems and networks required by the Pandemic and All-Hazards Preparedness Act, along with programs like HAvBED and the various electronic healthcare record initiatives, will be a good start toward creating the tools and the clear operational picture needed for planning and executing the relief mission.

These improvements will not come cheap. There must be a willingness to fund on a regular basis some programs that may not be utilized in earnest for years at a time. Strong leadership and management skills will be even more essential, for this is a complicated system that will not work well unless its many parts are truly coordinated. A fragmented effort or lax execution of the work will result in wasted time and money with little real improvement in the nation's preparedness. There is very good reason, though, to expect real advancement in this area. The new unity of responsibility and authority for medical matters within HHS provides the necessary framework to respond to the next great disaster, whether it is a hurricane, an earthquake, a terrorist attack, a pandemic, some combination of these, or something entirely different.

BIBLIOGRAPHY

1. Agency for Healthcare Research and Quality (AHRQ). National Hospital Available Beds for Emergencies and Disasters (HAvBED) System: Final Report, December 2005.

2. Alexander D. "The Study of Natural Disasters, 1977-1997: Some Reflections on a Changing Field of Knowledge," *Disasters*, 1997, 21(4), 284.

3. Bascetta C. "Disaster Preparedness—Preliminary Observations on the Evacuation of Vulnerable Populations due to Hurricanes and Other Disasters," Testimony before the Senate Special Committee on Aging, US General Accounting Office, May 18, 2006.

4. Bisgard JC, Mullaly CF. "The Civilian-Military Contingency Hospital System (CMCHS) in the USA," *J WAEDM*, 1:1, 1985.

5. Bowman S, Kapp L, and Belasco A. "Hurricane Katrina: DOD Disaster Response," *Congressional Research Service*, September 19, 2005.

6. Braun BI, Wineman NV, Finn NL, Barbera JA, Schmaltz SP, and Leob JM. "Integrating Hospitals into Community Emergency Preparedness Planning," *Annals of Internal Medicine*, 2006; 144:799-811.

7. Committee Testimony, "2006 Hurricane Season Preparedness," House Government Reform Committee, May 24, 2006.

8. Danzig R. "Catastrophic Bioterrorism—What Is To Be Done?," Center for Technology and National Security Policy, August 2003.

9. Dara SI, Ashton RW, Farmer JC, and Carlton PK. "Worldwide disaster medical response: An historical perspective," *Critical Care Medicine*, 2005 volume 33, no. 1 (Supplement).

10. Davis LM, et al. "Public Health Preparedness—Integrating Public Health and Hospital Preparedness Programs," RAND Corporation, prepared for the Department of Health and Human Services, 2006.

11. Department of Defense Directive No. 6010.22, National Disaster Medical System (NDMS), January 21, 2003.

12. Department of Health and Human Services. National Disaster Medical System, Office of Public Health Emergency Preparedness.

13. Department of Health and Human Services. Slide show presentation, "ESF #8 - Public Health and Medical Services."

14. Department of Homeland Security. “Metropolitan Medical Response System Overview,” February 1, 2006.

15. Department of Homeland Security. National Response Plan, December 2004.

16. DoD, TRICARE Management Activity. Contract No. MDA906-03-C-0011: Health Net Federal Services, Inc., 1 September 2003.

17. FEMA. Disaster News: Federal Agencies Collaborate to Aid Special Need Evacuations, August 16, 2006.

18. Fernandez LS, Byard D, Lin CC, Benson S, and Barbera JA. “ Frail Elderly as Disaster Victims: Emergency Management Strategies,” *Prehospital and Disaster Medicine* 2002; 17(2):67-74.

19. General Accounting Office (GAO). “Disaster Preparedness—Limitations in Federal Evacuation Assistance for Health Facilities Should be Addressed,” July 2006.

20. GAO-05-387R, “Veterans Health Care: VA’s Medical Support Role in Emergency Preparedness,” 23 March 2005.

21. GAO Testimony, “DoD and VA Health Care: Challenges Encountered by Injured Servicemembers during Their Recovery Process,” March 5, 2007.

22. GAO Testimony, “VA and Defense Health Care: Rethinking of Resource Sharing Strategies is Needed,” May 17, 2000.

23. Homeland Defense and Civil-Support Literature Review: Interim Report. Submitted to HQ NORAD-USNORTHCOM/SG from INTECON, 22 December 2006.

24. Issue Report, “Ready or Not? Protecting the Public’s Health from Diseases, Disasters, and Bioterrorism,” Trust for America’s Health, December 2006.

25. Kamoie B. Slide show presentation “Implementation of the Pandemic and All-Hazards Preparedness Act,” Department of Health and Human Services, February 7, 2007.

26. Kamoie B. “The National Response Plan: A New Framework for Homeland Security, Public Health, and Bioterrorism Response,” *Journal of Health Law*, volume 38 no. 2, Spring 2005, 287.

27. Koenig KL. “Homeland Security and Public Health: Role of the Department of Veterans Affairs, the US Department of Homeland Security, and Implications for the Public Health Community,” *Prehospital and Disaster Medicine*, October – December 2003.

28. Knouss RF. "National Disaster Medical System," *Public Health Reports*, 116, 2001 Supplement 2, 49.

29. Kormos WJ. Slide show presentation, "Ascertaining Deliberate/Available Medical Information in a National Contingency," Department of Defense, OASD/HA (Force Health Protection & Readiness), October 2006.

30. "Legacy of a Disaster: Health Centers and Hurricane Katrina, One Year Later," National Association of Community Health Centers, 2006.

31. Levinson DR. "Nursing Home Emergency Preparedness and Response During Recent Hurricanes," Inspector General, Department of Health and Human Services, August 2006.

32. Levinson DR, "The Commissioned Corps' Response to Hurricanes Katrina and Rita," Inspector General, Department of Health and Human Services, February 2007.

33. Lister SA. "Hurricane Katrina: The Public Health and Medical Response," *Congressional Research Service*, September 21, 2005.

34. Lister SA, and Gottron F. "The Pandemic and All-Hazards Preparedness Act (P.L. 109-417): Provisions and Changes to Preexisting Law," *Congressional Research Service*, January 25, 2007.

35. Lowell JA. "Medical Readiness Responsibilities and Capabilities: A Strategy for Realigning and Strengthening the Federal Medical Response" (FOUO), Department of Homeland Security, January 3, 2005.

36. Medical Reserve Corps, The Office of the Surgeon General, http://www.medicalreservecorps.gov, accessed on 17 March 2007.

37. Miskel JF. "Disaster Response and Homeland Security: What Works, What Doesn't," Praeger Security International, Westport, CT, 2006.

38. National Disaster Medical System (NDMS) After Action Review (AAR) Report on Patient Movement and Definitive Care Operations in support of Hurricanes Katrina and Rita, 12 January 2006.

39. NDMS Senior Policy Group Meeting Minutes (draft version), NDMS Conference, April 23, 2006.

40. Nelson C, Lurie N, and Wasserman J. "Assessing Public Health Emergency Preparedness: Concepts, Tools, and Challenges," *Annual Review of Public Health*, 2007.28:12.1-12.8.

41. NEMA 2006 Biennial Report: Organizations, Operations & Funding for State Emergency Management & Homeland Security, National Emergency Management Association.

42. Noji EK, Toole MJ. "The Historical Development of Public Health Responses to Disasters," *Disasters*, 1997, 21 (4), 366.

43. Panangala SV, "Hurricane Katrina and Veterans," *Congressional Research Service*, September 23, 2005.

44. Rodriguez H, Aguirre B. "Hurricane Katrina and the Healthcare Infrastructure: A Focus on Disaster Preparedness, Response, and Resiliency," *Frontiers of Health Services Management*, 23:1, Fall 2006.

45. Senate Report 109-319, accompanying the Pandemic and All-Hazards Preparedness Act. Senate Committee on Health, Education, Labor, and Pensions, August 3, 2006.

46. "Sounding Boards: The Civilian-Military Contingency Hospital System (CMCHS). Medical Care in Modern Warfare," *The New England Journal of Medicine*, 306:12, March 25, 1982.

47. Speers R, et al. "Assessing NDMS Response Team Readiness: Focusing on DMATs, NMRTs, and the MST," The CNA Corporation, prepared for the Department of Health and Human Services, December 2002.

48. The CNA Corporation, "Medical Surge Capacity and Capability: A Management System for Integrating Medical and Health Resources During Large-Scale Emergencies," prepared for the Department of Health and Human Services, August 2004.

49. "The Role of the Federal Medical Station (FMS) in Disaster Response: Lessons Learned from Hurricanes Katrina and Rita," The CNA Corporation.

50. Trabert E, et al. "After Action Review of Federal Medical Station (FMS) Operations During Hurricanes Katrina and Rita," The CNA Corporation, prepared for the Department of Health and Human Services, April 2006.

51. Trabert E. Slide show presentation, "The Role of the Federal Medical Station (FMS) in Disaster Response: Lessons Learned from Hurricanes Katrina and Rita," The CNA Corporation, June 26, 2006.

52. TRICARE Stakeholders Report, http://199.211.83.169/stakeholders/archive.cfm, accessed on February 26, 2007.

53. US Army Medical Command. Slide show presentation, “Defense Support to Civil Authorities & National Disaster Medical System,” February 2007.

54. Vanderwagen WC. “Testimony: HHS Preparedness for Public Health Emergencies Based on Lessons Learned After Hurricanes Katrina and Rita,” Committee on Government Reform, U.S. House of Representatives, May 24, 2006.

55. “VHA Vision 2020: Charting a New Direction…” Department of Veterans Affairs, Veterans Health Administration, April 2003.

56. Vojtasko MC. Slide show presentation, “Emergency Management Strategic Healthcare Group (EMSHG): A Historical Perspective,” Veterans Health Administration, Department of Veterans Affairs.

57. Wasserman J, et al. “Organizing State and Local Health Departments for Public Health Preparedness,” RAND Corporation, prepared for the Department of Health and Human Services, 2006.

58. White House. “News Releases for August 2005,” http://www.whitehouse.gov/news/releases/2005/08, accessed on March 25, 2007.

59. Winchester S. “A Crack in the Edge of the World,” HarperCollins Publishers, New York, NY, 2005.

60. Winkenwerder W. “National Patient Accountability, Movement, and Regulating System” memorandum, The Assistant Secretary of Defense (Health Affairs), February 3, 2005.